b.—PATHOLOGY OF THE NERVOUS SYSTEM, AND PATHOLOGICAL ANATOMY.

THE DIAGNOSTIC VALUE OF THE TENDON-REFLEX.—Dr. A. McLane Hamilton, *Boston Medical and Surgical Journal*, Dec. 19, gives an account and analysis of eight cases of locomotor ataxia, in four of which the tendon-reflex was absent, as is stated to be the case in this disease by Westphal, while in the remainder it was present and in some cases even exaggerated. These latter were not less marked instances of the disease than the others, so far as the diagnosis could be made during life.

The deduction of Tschiriew that the absence of this symptom indicates a degeneration of the posterior columns at the horizon of the third and fourth roots of the crural plexus, and that when the morbid process does not reach as low as this, it may still be present, may perhaps account for the variations we observe, but further investigations and post-mortems are requisite before we can give this symptom its exact value in diagnosis.

DR. C. H. HUGHES, *St. Louis Medical and Surgical Journal*, Feb., also devotes a paper to this subject, in which he gives the result of the testing of this phenomenon in a number of healthy individuals, and patients suffering from nervous disorders, and concludes, that its absence is by no means necessarily diagnostic of any spinal disease, and only of importance when associated with other symptoms.

THE following is the abstract of a paper read before the Royal Medical and Chirurgical Society, Jan. 28 (rep. in *Brit. Med. Jour.*, Feb. 1), by Dr. W. R. Gowers, and entitled "A Study of the So-called Tendon-Reflex Phenomena," together with the discussion that succeeded it:

The paper recorded a series of observations on the two forms of muscular spasms commonly known under the above designation; that normally produced in the quadriceps extensor of the knee on striking the patellar tendon (knee-reflex), usually absent in locomotor ataxy and excessive in lateral sclerosis of the spinal cord; and that clonic movement which occurs at the ankle-joint on sudden dorsal flexion of the foot, in lateral sclerosis of the cord (ankle-clonus). To ascertain the characters of the knee-reflex, it was examined in three hundred patients, of whom one hundred and fifty were the subjects of simple epilepsy. Of the whole three hundred, it was absent on both sides in eighteen, of whom five had ataxy, three paraplegia without ataxy, one suffered from old hemiplegia, one from vertigo, one from tumor cerebri, one from old rickets, and the remaining six from epilepsy, five being girls. Two only of the eighteen were good walkers. Of twenty-seven hemiplegics, the reflex was equal on the two sides in thirteen, excessive on the weaker side in fourteen. In three cases, it was absent in one leg only; two of these presented weakness of the leg in which it was present; in the third it was absent in the leg in which the patella had been fractured

and the two halves were separate. Of one hundred epileptics, with good walking power, the movement of the foot in ninety was between one and three inches; it was absent In none, excessivc in six; the average was just two lnches. Of twenty-two epileptics, with had walking powers, it was ahsent in five and excessive in five. The rcasons for regarding it as a spinal reflex were strong, especially Its loss in spinal disease, its arrest hy section of the crural nerve, its radiation to the other leg in animals, which the author had ohserved in several cases in man (and also a radiation to the hack muscles); and, lastly, the graphic study of the movement. Tracings were shown, taken on a manograph-drum, the writing-pen heing fixed to the foot. The effect of the tap and the muscular contraction were hoth marked, and were separated hy an interval of .09 to .15 second, the common interval in health and disease heing .10 or .11 second. This corresponded with the time necessary for a reflex action (conduction .045 second, latent stimulation .01 second, reflex process on spinal cord .05 second). Reasons were given for doubting the accuracy of the shorter lnterval obtained by Tschirjeff, with the foot fixed. The interval was sometimes occupied, in some cases the latter part only, hy a slight rise, due to a muscular contraction, probably indicating a direct stimulation of the muscular fihres. As a spinal reflex, the question of the origin of the afferent impulse in the tendon, or in the muscle, by sudden tension, must be left open. Facts were mentioncd pointing to thc latter view. As a rcflex, it was arrested by damage to the posterior nerve-roots (as in locomotor ataxy), by disease of the grey matter (as in muscular atrophy involving the quadriceps, sometimes, as in a case related, when sllght only), or by damage to the anterior roots (as in old meningitis). It was also lost in advanced pseudo-hypertrophic paralysis. Its occasional persistence in locomotor ataxy was connected with slight damage to the posterior root-fihres, as was shown hy sensation heing little or not affected, and commonly by thc ahsence of lightning pains (Buzzard, Westphal). A case of mixed lateral and posterior sclerosis was related, in which sensation was more affected, lightning pains greater, and knee-reflex lost in one leg; while in the other leg the knee-reflex was present, sensation was less affected, and llghtning pains were slighter, though occurrlng. From forty tracings of the ankle-clonus, thc regularity and timc of the movement had been ascertained. From five to scven contractions occurred per second, the average being 6.1. During the intervals, the relaxation of the muscles was incomplete; a certain residual contraction persisting. A similar clonus mlght often be obtained on the plantar adductor pollicis, of which tracings were shown, havlng nearly tbe time of the ankle-clonus, and had heen met with by the author in one case, and also a knee-clonus (in the quadriceps), having, however, a much slower tlme (2.5 per second). In the ankle-clonus, did the stimulus act on the tendon or on the muscle? It could not he excited hy any stimulus applied to the tendon, whlch did not increase its tension, and, therefore, which did not act upon the muscle. A lateral tap on the tendon would not cause it, if the tendon were carefully supported on the other side. The tendon was very sensitive to a pinch; but this caused a quite different effect. On the other hand, the initial contraction could hc excited hy tapping the muscle, which could affect the tendon very little. The question of

its reflex nature was next considered. The author had found that in cases in which the ankle-clonus could he obtained, and in slighter cases of similar central disease in which it was not obtainable, or had passed away, a tap on the anterior tibial muscles, during passive dorsal flexion, excited a contraction in the muscles of the calf, which did not occur when the adjacent tibia was similarly tapped, and so could not he the result of increased tension. This appeared at first to he of a true reflex nature; hut, on taking tracings, the interval between the taps and the contraction was found to be only .03 to .04 second, insufficient for the mere conduction to and from the cord, and less than half that necessary for a spinal reflex. The stimulation of this muscle must be direct, by the vibration of the tap, which could indeed, even in health, be felt hy the hand placed on the calf. Other measurements showed that, in lateral sclerosis, the interval hetween the tap on the Achilles tendon and on the muscle, and the resulting contraction (during passive dorsal flexion), was .025 to .04 second and .035 to .04 second respectively—quite insufficient for a reflex. Therefore, the stimulation of the muscle must be direct, not reflex; and, therefore, not from the tendon. But this did not exclude all reflex influence; the extreme irritahility to local stimulation, excited by tension, might he reflex. Tension on muscular fibres caused an afferent impression (painful when long continued or after cramp), and tracings showed that the irritahility was not developed instantly on the tension first heing put on, but gradually, after a period long enough for a reflex. If the tension were previously put on, the first contraction was as strong or stronger than the rest. Hence it was understood why, though local, it occurred in spinal sclerosis. The reflex phenomenon in these cases on stimulating the skin or pinching the tendo Achillis was then considered (flexor tonic spasm exciting and broken hy the ankle-clonus), and its relation to spinal epilepsy. The intervals between the contractions of the knee-clonus hore the same ratio to those of the ankle-clonus as did the interval between the tap and the isolated contraction of the knee-reflex, to the interval hetween the tap on the tendo Achillis and the contraction of the calf. Hence each contraction on the ankle-clonus was prohably reflex, excited hy the sudden tension on the muscle from the effect of the proceeding contraction. In the muscles of the calf and great toe the sequence of tension and contraction occurred at each step in walking, and a physiological reflex between the two was probahly developed in the act of learning to walk. The author had never seen the ankle-clonus in spastic paraplegia in a child who had not walked. A reflex relation between tension and contraction prohably played an important part in the co-ordination of often repeated movements, and its loss might he part of the pathological state in locomotor ataxy, in which the allied knee-reflex was also lost. The ataxic and the child learning to walk might thus he similar in this condition as well as in appearance. If this view of the ankle-clonus were correct, it should he a normal phenomenon excessive in disease. Four tracings of the movement, from four healthy individuals, were exhibited, showing the same uniformity and time as in disease. They were taken in the sitting posture, with the hall of the foot resting on the ground, when the ankle-clonus, set up voluntarily, would go on independently.

The President, in expressing the thanks of the Society to Dr. Gowers for his elaborate paper, suggested that it would be useful in such communications to denote the points which it was specially intended to illustrate or prove. Dr. Buzzard said that the paper dealt with two interesting phenomena, the "patellar tendon-reflex" and the "foot-clonus." As regarded the patellar reflex, the tendency of investigation was to show that its absence was an early sign of locomotor ataxy. The difficulty in standing with the eyes closed, pointed out as a test by Romberg, was of value; but, in its early stage of ataxy, this often was not present; and, in such cases, he believed the absence of patellar tendon-reflex would be very valuable. He had not yet found patellar tendon-reflex present in any typical case of locomotor ataxy; it had been retained in cases of ataxy or of ataxy combined with other symptoms; but was absent in ataxy accompanied with lightning pains. A very close connection would probably be found between the absence of patellar tendon-reflex and the characteristic pain of ataxy. As regarded the foot-clonus, if it were determined (as was very probable) to be an evidence of organic disease of the spinal cord, it would be an important means of distinguishing between trivial functional affections and grave structural diseases of the cord. He believed that Dr. Gowers' paper was the first in which the graphic method had been applied to the subject. He had been struck with the very probable explanation of ankle-clonus given by Dr. Gowers — that it was probably the pull on the intra-muscular nerves that caused the contraction. He was rather inclined to differ from Dr. Gowers when he said that the patellar tendon-reflex could be produced by a blow on the quadriceps extensor muscle. In some cases of ataxy, a blow on the vastus externus produced a slight upward movement of the foot, but this was different from the jerk produced by striking the tendon of a healthy man. He believed that the contraction produced when the muscle was struck, was due to the direct stimulation of the muscle itself. Dr. Andrew inquired as to the prognostic value of patellar tendon-reflex with lightning pains. He had met with a case in which the lightning pains had been present thirty-four or thirty-five years without any other symptoms of locomotor ataxy. The patellar tendon-reflex was absent; how long it had been so he, of course, could not say. Dr. Gowers said that the value of the absence of patellar tendon-reflex was diagnostic, not prognostic. Dr. Andrew's case was probably one of ataxy arrested in the first stage. Cases sometimes occurred in which the lightning pains persisted many years without other symptoms of locomotor ataxy. Almost all evidence was in favor of the connection between loss of patellar tendon-reflex and lightning pains. Absence of disorder of sensation, and absence of lightning pains indicated that the affection of the cord was slight. Perhaps, as an exception, a case might some day be met with in which the patellar tendon-reflex was preserved while lightning pains were present. A slight contraction might be produced in some cases by striking the muscle; but, when he spoke of exciting patellar tendon-reflex by a blow on the muscle, he referred to instances where the tendon-reflex was in excess, and where striking the muscle would cause a jerk of two or three inches in the same way as a blow on the tendon.

It will be perhaps remembered that in the issue of this journal for October, 1878, we mentioned a case in which all the symptoms of tabes had existed for years, the fulgurant pains included, and yet at the close of life the tendon-reflex was even exaggerated. In his recent lecture on the Diagnosis of Locomotor Ataxia (*Am. Clin. Lectures*, Vol. III., No. XII.) Dr. E. C. Seguin gives among the symptoms of the first stage of the disease, which designates the "stage of fulgurating pains," a *diminished* tendon-reflex at the knee, and includes its absolute loss as a symptom of the second or ataxic stage. It seems to us still that more light is needed on the subject before we can assign to this symptom its correct value in the diagnosis of the disorder. It has evidently been over-valued by Westphal in his first utterances in regard to it, and we now have an accumulation of more or less conflicting observations and opinions from various authorities.

A Prodromic Sign of Spinal or Cerebro-Spinal Affections.—At a recent clinic at La Pitie, M. Laségue called attention to a point in a case of paralysis agitans which is worthy of note, and we therefore translate the paragraphs relating to it from the *Gazette des Hopitaux*, No. 4, in which they occur.

The subject of this observation is a man aged fifty-one, formerly a clerk, with no morbid antecedents, either personal or hereditary, and even of a robust constitution. A little more than eight years ago, in 1870, while he was at his desk, he was taken all at once, without any apparent cause, with a severe pain in the iliac region. This pain has lasted since then continuously, with frequent exacerbations.

Here M. Laségue, interrupting the recital of the history of the case, called attention to the double peculiarity of the lack of morbid antecedents, and the outset of the disease, by a pain in the iliac region, near the anal fold, a local pain of an altogether peculiar character, not to be explained as a neuralgia, being on the track of no nerve and following the course of none, as known; not by any inflammation, nor by rheumatism, of which, moreover, it possesses none of the characters, being neither increased nor diminished by pressure, or modified in any manner whatever by any external agent. Whenever, said M. Laségue, you meet in a man in such good condition as this one, without any known or appreciable cause, one of these *bizarre* pains, not explainable either by a neuralgia, an inflammation or rheumatism, which is not affected by pressure or by any external agency, you may say to yourself that you are in the presence of an incipient spinal or cerebro-spinal affection. This kind of pain is not specially characteristic of paralysis agitans; it is a prodrome common to spinal diseases, as we see in the fulgurant pains of locomotor ataxia and the pains that precede general paralysis. Its explosive appearance does not, therefore, suffice to indicate the character and nature of the disorder of which it is the first manifestation; but it certainly announces the imminence of a cerebro-spinal affection; it is, to adopt M. Laségue's picturesque expression, only the telegraphic signal announcing the message, of the contents of which it gives no indication.